paler ground. Underneath the primaries are yellowish, with a large black discal spot containing a white point; a submarginal dark lunular line. Secondaries underneath reddish brown, thickly speckled with black; a white discal point, and a transverse, lunular brown line. Thorax brown, with posteriorly a number of white hairs. Abdomen reddish.

Expanse 54 mm.

Hab. Petropolis, Brazil.

AUTOMERIS TAMPHILUS, sp. nov.

Primaries above fawn-colour, tinged with reddish; the outer margin yellowish; the basal and outer transverse lines a little paler than the ground-colour; the outer line extending from near the apex on the costal margin to the inner margin at three fourths from its base. Secondaries yellowish red, the outer margin paler; the ocellus not very large, brown, circled with black and then with yellow; in its centre a minute greyish spot with a white streak; a submarginal black line inwardly edged with yellow. Head and thorax dark brown. Abdomen reddish.

Expanse male 90 mm.

Hab. Rio Janeiro, Brazil.

5. Notes on the Anatomy and Osteology of the Indian Darter (*Plotus melanogaster*). By FRANK E. BEDDARD, M.A., F.R.S.E., Prosector to the Society.

[Received March 15, 1892.]

The structure of the soft parts of both *Plotus anhinga* and *P. melanogaster* has been fairly completely described by my two predecessors, Prof. Garrod[1] and Mr. Forbes[2]. Prof. Garrod has also given a brief account of some of the peculiarities of the third species, *P. levaillanti*, in a later paper[3]. So far as I am aware, the only existing account of the visceral anatomy of *P. melanogaster* is to be found in Mr. Forbes's notes upon this bird. More recently Prof. Fürbringer, of Jena, has contributed[4] to our knowledge of this genus in his great work upon the shoulder-girdle of birds. Having recently had the opportunity—afforded me by the death, on December 31st of the present year, of a female *P. melanogaster*, which arrived at the Gardens on May 1883—of dissecting an example of that species, I have been able to make some slight additions to what is already on record about the bird. As will be easily imagined, I have only to confirm the careful work of Mr. Forbes, so far as that goes;

[1] "Notes on the Anatomy of *Plotus anhinga*," P. Z. S. 1876, p. 335.

[2] "On some Points in the Anatomy of the Indian Darter (*Plotus melanogaster*), and on the Mechanism of the Neck in the Darters (*Plotus*), in connexion with their Habits," P. Z. S. 1882, p. 208.

[3] "Note on Points in the Anatomy of Levaillant's Darter (*Plotus levaillanti*)," P. Z. S. 1878, p. 679.

[4] Untersuchungen zur Morphologie und Systematik der Vögel, &c., 1888.

there are a few points, however, to which Mr. Forbes does not refer. To these I have naturally paid particular attention. As regards the musculature, Mr. Forbes only refers to some of the muscles of the neck; but, Fürbringer having dissected the shoulder-muscles, I have confined my attention to the muscles of the hind limb.

Myology.

As I have already said, the muscles of the anterior limb have been described by Fürbringer. In the hind limb I find no noteworthy differences from *P. anhinga*. The "muscle formula" is the same, *i. e.* AX+.

The *Semitendinosus* is a comparatively slight muscle; Garrod speaks of it in *P. anhinga* as being very large. It arises entirely from the pubis, and is inserted in common with the *Semimembranosus*.

The *Semimembranosus* is a very large and stout muscle; at its origin it is nearly as wide as the *Biceps*; it is inserted by a strong flat tendon, on to which tendon, just at its commencement, is inserted the *Semitendinosus*.

There are two *Adductors*, of which the inner is much the largest; this muscle is tendinous at its origin, and it has also a tendinous insertion of some length on to the underside of the femur.

The *Gastrocnemius* has the usual three heads of origin; the middle head arises partly from the innermost adductor, and also by a very slender tendon from the *Semimembranosus*.

The *Tibialis anticus* has a single and undivided tendon; in many birds the tendon of this muscle splits into two at its insertion.

There are two *Peroneals* present; the *Peroneus longus* is, as is invariably the case with this muscle when present, attached to the tendon of one of the deep flexors.

As to the deep flexors, the *Flexor hallucis* is bound by a strong vinculum to the *Flexor profundus* just at its trifurcation.

Viscera.

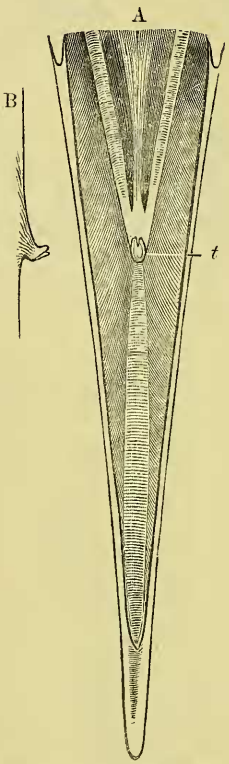
The accompanying drawing (fig. 1, p. 293) illustrates the very rudimentary tongue. Mr. Forbes does not mention the tongue, though it might be inferred from his silence on the point that the organ resembles that of *Plotus anhinga*. I have thought it worth while to have a drawing prepared, as this structure has not been, to the best of my knowledge, figured. Professor Garrod's remark that "the tongue, as an independent organ, does not exist" applies to *Plotus melanogaster* no less than to *Plotus anhinga*; there is in the former species, as apparently in the latter, a minute process, shown in the drawing, which is all that is left of the tongue.

I may remark that the right lobe of the liver, as in *P. anhinga*, is larger than the left; and that there is a well-developed gall-bladder (see fig. 2, p. 294), the duct of which opens as shown in the drawing.

The same drawing also illustrates the arrangement of the pancreatic ducts, to which neither Garrod nor Forbes make any allusion in either species. There were two minute cæca in my specimen.

The stomach agrees perfectly well with Mr. Forbes's description of that organ. Some of the membranes surrounding the stomach have

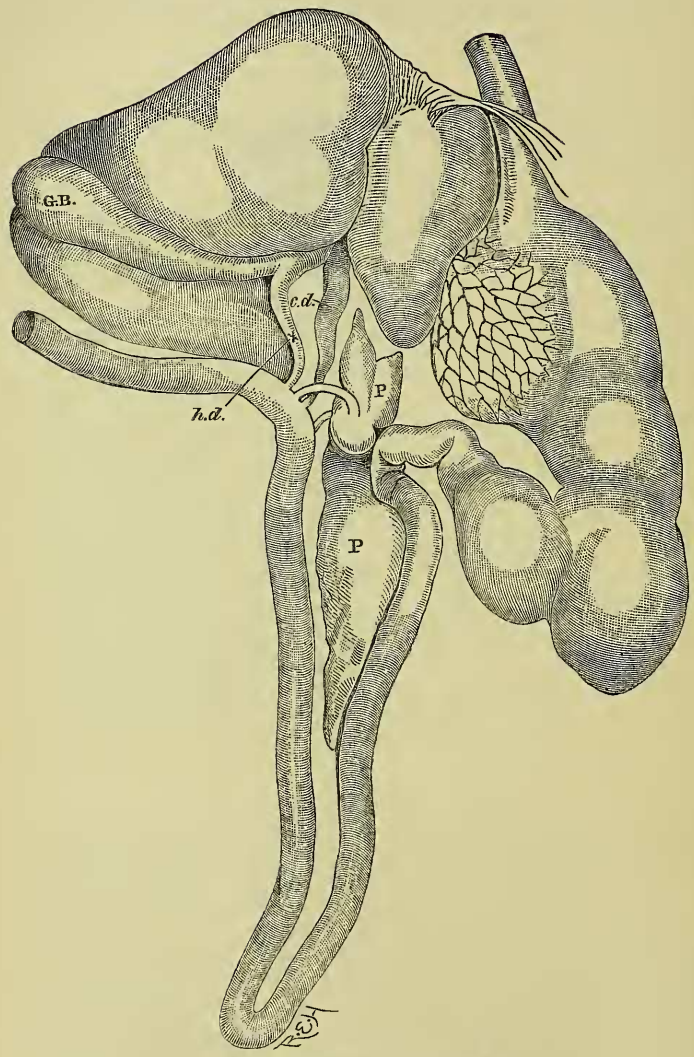
Fig. 1.



A. Lower mandible of Indian Darter, to illustrate rudimentary tongue (*t*);
B. Rudimentary tongue in profile.

rather a peculiar arrangement. The liver lies near to the posterior end of the thoracic cavity, and a considerable space is thus left between its anterior border and the apex of the heart. This is a very unusual state of affairs. As a general rule the front end of the liver is nearly in contact with the heart. Unfortunately I have not had the opportunity of observing how matters stand with *Phalacrocorax*, *Pelecanus*, and *Sula*. This space which divides the liver from the heart is of course bounded laterally by the oblique septa, and behind by a membrane shutting off this space from the liver. It

Fig. 2.



Alimentary viscera of Indian Darter.
G.B., Gall-bladder; *h.d.*, *c.d.*, Bile-ducts; P, Pancreas.

probably has, though I have not definitely made out the fact, a connection with the air-sacs.

Osteology, and Comparison with Plotus anhinga.

The osteology of the Darters has received attention from Brandt[1], Eyton[2], Donitz[3], Garrod[4], and Milne-Edwards[5].

The only one of these authors to describe and figure the species which is the subject of this communication is M. Milne-Edwards. The entire skeleton, as well as the separate bones, are figured in the magnificent work upon the Natural History of Madagascar, now in course of publication.

Milne-Edwards, however, does not do much more than describe the osteology of *Plotus melanogaster*; there is but little in the way of a comparison between this and other species. My object in the present paper is to point out the principal differences between *Plotus melanogaster* and *P. anhinga*. I must first of all refer to an interesting matter concerning the skull, which has already been dealt with by Garrod for *P. anhinga*.

In the figure illustrating the skull[6], Garrod has indicated a small rod (lettered "*a*") attached to the occipital bone. Of this he writes as follows:—"In speaking of *Phalacrocorax cristatus*, Mr. Eyton remarks, the tubercle on the upper edge of the occipital bone has a pointed, movable, triangular process attached to it, which I suspect has also been the case with my specimen of *Plotus*, but has been lost."

In the Society's female specimen there is a fibro-cartilaginous, similarly situated process, not more than one sixth of an inch long, which is ossified in the evidently older male. In his notes on the anatomy of the Cormorant, Hunter tells us that "a small bone, about an inch long, passes back from the os occipitis and gives origin to the temporal muscle, which is very strong." The same bone in the Darter, although comparatively not so long, performs the same function, the superficial temporal muscles meeting behind the skull along the median raphe, which becomes ossified to form the above-mentioned bony style in the adult bird."

This is not figured by Milne-Edwards, but I found the bone in *Plotus melanogaster* attached precisely as is figured by Garrod for *P. anhinga*. The bone was of a triangular form, thus resembling more closely the corresponding bone of the Cormorant. It was entirely ossified. In comparing the two skulls of *P. anhinga* and *P. melanogaster*, the process of the occipital bone to which the ossicle in question is attached is seen to have a truncated form in *P. melanogaster*, whereas in *P. anhinga* it has, as Garrod has correctly figured, a more conical form, terminating in a point.

[1] Mém. de l'Acad. Imp. de St. Pétersb. t. v. (1839).
[2] Osteologia Avium, p. 218.
[3] Archiv f. Anat. u. Phys. 1873, p. 357.
[4] *Loc. cit.*
[5] Histoire nat. de Madagascar, t. xii. p. 690.
[6] *Loc. cit.* pl. xxviii. fig. 1.

The chief difference between the skulls of *P. melanogaster* and *P. anhinga*, apart from the form of the occipital style, is in the form of the palatine bones; in *P. anhinga* these bones are rounded off posteriorly, the lateral margins curving inwards gradually. In *P. melanogaster*, on the other hand, the thin lateral wings of the palatines form a right angle behind; they are cut perfectly square.

There are no other very salient points of difference in the skulls of these two species; in *Plotus melanogaster* the ridges which bound the temporal fossæ above are more pronounced than in *P. anhinga*; but possibly this is rather a difference of age than of species. However, in Garrod's figure of the skull of *P. anhinga*, which represents that of an adult bird, and has been drawn, no doubt, from one of the two skulls now in my custody, the same difference is apparent; the stronger development of the occipital style in *P. melanogaster* perhaps needs a stronger development of these ridges, for the two together form the line of origin of the temporal muscle.

The postorbital processes are better developed in *P. anhinga* than in *P. melanogaster*; this cannot be a question of age, for the skull of *P. melanogaster* is that of a younger bird than that of *P. anhinga*.

With regard to other parts of the skeleton, the only differences that I could detect concerned the ribs and the vertebral column.

The skeleton of *Plotus anhinga* has a very rudimentary rib, consisting of a small bit of bone, not more than half an inch in length, attached to about the middle of the last complete rib. This is absent from the skeleton of *P. melanogaster*, and has certainly not been lost, for that skeleton was prepared with the greatest care.

The ossification of "Donitz's" Bridge has been mentioned by Mr. Forbes.

6. Descriptions of Seven new Species of Land-Shells from the U.S. of Colombia. By G. B. Sowerby, F.L.S., F.Z.S.

[Received March 1, 1892.]

(Plate XXIII.)

Bulimus guentheri, n. sp. (Plate XXIII. figs. 7, 8.)

Testa anguste perforata, ovata, solida, lævis, fusca, flammis albidis irregulariter angulatis et undulatis picta; spira conica, breviuscula, apice obtusiusculo; anfractus $4\frac{1}{2}$, *convexi, ultimus* $\frac{2}{3}$ *longitudinis æquans, inflatus, basi rotundatus; columella fere verticalis, plica obliqua crassiuscula munita; apertura ovalis, leviter obliqua, intus griseo-fusca; peristoma crassum, reflexum, marginibus callo crassiusculo junctis.*

Long. 41, *diam. maj.* 26 *millim.; apertura* 12 *lata,* 22 *longa.*

Hab. U.S. of Colombia.

This species is remarkable for the smoothness of its surface, having neither granules nor striæ. In form it somewhat resembles *B. cardinalis* (Pfeiffer), while its markings are like those of a